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BLOWING EGGS OF LEPIDOPTERA.

BY J. D. GUNDER,
Pasadena, Calif.

The preservation of the eggs of butterflies and moths, as objects for study, has always been found a very difficult matter. The structures of their shells are so delicate and porous that if the eggs are allowed to dry either naturally or otherwise, they shrink quite out of shape due to the evaporation of the fluid part of their contents and to prevent this shrinkage by immersing the eggs in various liquids has not been found convenient for their later examination.

The idea of blowing the eggs is not a new one; but at the present time I believe no one in America is doing this work except Mr. T. M. Blackman of Los Angeles and Mr. Blackman has allowed me to report his activities in this line to the readers of the Canadian Entomologist and to him goes full credit for all the data contained in this article.

It seems to be only recently that serious work has been done in blowing the eggs. Blown specimens mounted on slides for the microscope have been reported as shown at several Entomological Societies in Europe and Dr. Britton of Manchester, England, has attained much success in preparing such slides. Just here it might be mentioned that, after blowing the eggs, attempts have been made to fill the emptied shells with colored wax to give them the appearance of fresh specimens, but so far the process involved has not been perfected.

After many and varied experiments, Mr. Blackman has succeeded in blowing the eggs of many of the larger specimens of butterflies and moths, though attempts with the smaller and more delicate eggs have not been entirely satisfactory, due perhaps to the lack of time required to invent necessary experimental equipment.

The eggs of the Satyridae are easy to preserve in this way because their shells are fairly hard and firm and of comparatively good size, while those of many of the larger moths would afford good practice for a beginner in this work.

The requirements in the way of apparatus for the actual blowing of the eggs are few and simple, consisting of a supply of fine glass blow-pipes, a very fine pointed needle, a foot or so of rubber tube of a size suitable to attach to the blow-pipes, and a piece of white blotting paper. When the insect can be induced to lay eggs upon some permanent support, such as paper, it helps considerably, and the paper chosen should be of some dark color in order to show up the shells later to advantage under the microscope. Should the egg be laid upon a stem or blade of grass, this natural support will be found of sufficient permanence when fully dried, but in the case of many sorts of leaves and petals of flowers, it is perhaps better, either before or after blowing, to very carefully detach the egg and mount it upon some dark paper by means of a very minute touch of adhesive, or by coating the entire surface of the paper, previous to putting on the egg, with some adhesive which dries with a dull surface; gum tragacanth being most used for this purpose. The blow-pipes should be made by taking a piece of glass tube,

388016

Blown egg of
Epinephele tithonus
EPINEPHELE
TITHONUS.
ova.
(Contents
Removed)
T. M. Blackman
A completed slide
Blown egg of
Fredia ephiphron

some five inches long and one-quarter inch in diameter, and drawing it out to two fine pointed pieces while the center is heated over the flame of a spirit lamp; the tube being slowly revolved in the process in order to keep it evenly heated on all sides. It is best to prepare several such glass blow-pipes and have them in readiness because the points are so fine and frequently get broken. After drawing out the tube the fine ends should be broken off a little at a time until the end is just sufficiently large to allow air to pass through.

When blowing the eggs it is best to hold the object on which the egg is laid with forceps in the left hand and after examining the egg with a lens to decide the best position for the aperture; a puncture, generally down on one side near the base of the egg, is then made with a fine needle. Next the blow-pipe of suitable fineness, attached to the rubber tubing, may be carefully inserted while blowing steadily. If the operation is successful, a minute quantity of liquid will be seen to be expelled from the aperture; this should be immediately cleaned off by carefully wiping it off with a torn edge of a small piece of blotting paper, which should be first slightly dampened to cause it to absorb the moisture more readily. If on examination with a lens, the shell is seen to be quite free from liquid contents and undamaged, it may, after being left a few hours to become quite dry, be mounted as a permanent object for the microscope.

Eggs are better mounted as opaque slides. The egg or support on which it has been laid should be glued on a circular piece of black or dark colored paper within a ring of ebonite or metal of just sufficient height and the whole covered with a thin circular cover-glass. The object mounted, as well as the paper backing, the cover-glass and slide, should be free from moisture when it is being fixed. It is better to keep these assorted parts in a warm, dry place just before assembling, and of course, the exclusion of dust is necessary in all microscopic slide making. Either marine glue or gold size, which is prepared and sold for the purpose, will be found to serve well for sticking the rings and cover-glasses.

For some unknown reason fertile eggs seem to have the best chance of being blown successfully, but care must be taken to operate before development has advanced too far, otherwise the rudimentary embryo cannot be expelled. The condition of hardness of the shell also affects the result, and this seems to vary with the age of the egg. In the case of Satyrid butterflies, their eggs are most easily blown about forty-eight hours after being deposited. The beautiful and delicate eggs of the Plebejinae and Asciidae could probably be blown if it were known at just what stage their shells afforded the maximum rigidity. Some eggs of lepidoptera, even after the larvae have emerged, will be found quite worth while mounting. Many larvae make their first meal by devouring the shell from which they came and it has been written that some do not survive if prevented from doing so.

Great care should be taken in correctly labelling each slide, so they will not get mixed up and it is a good plan to record on another label on what the egg was deposited on and whether by a free or captive insect. Any of the cabinets sold for the purpose of storing microscopic slides are of course suitable for containing a collection of butterfly eggs, the most convenient kind probably being

those having shallow trays in which the slides lie flat. These trays have narrow stripes of wood separating the slides from each other, which prevents their becoming mixed up in the event of the whole case being upset.

The half-tone plate accompaning this article shows a completely mounted slide containing two blown eggs, one of which is depicted on the left and of course greatly enlarged. The egg on the right shows two small holes down near its base where it was punctured for blowing.

THE UNKNOWN NYMPHS OF NORTH AMERICAN ODONATA.

BY C. FRANCIS BYERS,

Cornell University, Ithaca, N.Y.

On the first of April 1927, the following letter, together with the tentative list of unknown nymphs referred to, was sent by the author to the following twelve Entomologists interested in American Odonata: Dr. C. S. Brimley, Dr. P. P. Calvert, Mr. W. T. Davis, Dr. Philip Garman, Dr. C. H. Kennedy, Mr. B. E. Montgomery, Dr. R. A. Muttkowski, Dr. R. H. Howe, Dr. R. C. Osborne, Dr. F. M. Root, Dr. E. M. Walker, and Mr. E. B. Williamson.

"Dear Sir: In preparation for Dr. Needham's, "Handbook of the Dragonflies of North America," we desire to have an accurate list of the known Dragonfly nymphs of the American species North of Mexico. Due to the fact that many of the nymphal descriptions have appeared in faunal lists, ecological papers, and other scattered places, it has been difficult to compile such a list. Inclosed is a list of species the nymphs of which we believe are unknown.

We would appreciate the favor, if, after carefully reading this list, you would.

1.—Cross out species that you know have been described, and give complete references if possible.

2.—List the undescribed species of which you have material upon which a description could be based. If you do not intend to publish the information soon, for the sake of completeness we would be glad to borrow the specimens and do it for you.

3.—Indicate species not appearing on the list that you believe to be, as yet, unknown.

Please sign the list and return it to me, even though you find it correct as it stands."

The response to this letter was particularly gratifying and the returned annotated lists were thankfully received and were a great help in our work. The composite list embodies the notes and corrections so kindly made by these men. Dr. Calvert, Dr. Walker and Dr. Garman indicated in response to the second inquiry of the letter, their intention to publish soon the life histories of several here-to-fore unknown nymphs. Dr. Brimley sent to us the exuvia of *Macromia georgiana*. Mr. W. T. Davis wrote that he had a new species of *Neurocordulia* to describe, and the author is describing two new species of *Enallagma*, thus adding three unknown nymphs to the old list. The list as finally revised follows:

LIST OF THE UNKNOWN NYMPHS OF THE ODONATA OF NORTH AMERICA NORTH OF MEXICO.

Tanypteryx: hageni.

Cyclophylla: protracta.

Ophiogomphus: anomalus, phaleratus, howi, montanus, arizonicus.

Herpetogomphus: compositus, diadophis, lampropeltis.

Gomphus: brimleyi, lineatifrons, parvidens, viridifrons, abditus, adelphus, consanguinus, whedoni, lentulus, pallidus, subapicalis, militaris, williamsoni, donneri, cavillaris, ventricosus.

Gomphaeschna: furcillata.

Oplonaeschna: armata.

Gynacantha: bifida, nervosa.

Tricanthagyna: trifida.

Aeshna: mutata, arida.

Coryphaeschna: virens.

Cordulegaster: erroneus, faciatus.

Macromia: alleghaniensis, annulata, australensis, georgiana, pacifica, wabashensis.

Neurocordulia: (new species of W. T. Davis.)

Epicordulia: regina.

Platycordulia: xanthosoma.

Tetragoneuria: costalis, morio, petechialis, semiquaea, spinosa, stella.

Dorocordulia: lepida.

Williamsonia: lintneri, fletcheri.

Somatochlora: walshii, ensigera, georgiana, provocans, filosa, incurvata, septentrionalis, sahlbergi.

Libellula: comanche, composita, jesseana, nodistica, semifasciata, vibrans.

Plathemis: subornata.

Dythemis: fugax } Needham described one of these as a guess.
Pseudoleon: superbus } Probably the latter.

Lepthemis: vesiculosa.

Sympetrum: ambiguum, antripes, verum.

Celethemis: amanda, bertha, martha, ornata, fasciata, monomolena.

Brachymesia: furcata, gravida.

Tramea: insularis, cophysa, virginica.

Macrodiplax: balteata.

Agrion: amata, dimidiatum.

Hetaerina: sempronia, septentrionalis, titia, vulnerata.

Lestes: alacer, inequalis, sigma, vidua.

Argia: bipunctulata, immunda, impura, tonto, translata, alberta, hinei, solita, rita.

Argiallagma: minutum.

Enallagma: aspersum, basidens, concisum, cardenium, clausum, coecum, cultellatum, divagans, dubium, eiseni, minusculum, pictum, piscinarium, pollutum, pallidum, semicirculare, sulcatum, laurenti, recurvatum, anna, culicinorum, weewa.

Nehalennia: integricollis, pallidula.

Coenagrion: angulatum, interrogatum.

Ischnura: kellicotti, gemina, erratica, prognatha, utahensis, ramburii, damula, demorsa.

Oxyagrion: rufulum.

Neonura: aaroni.

In connection with this list the following table will prove of interest:

TABLE

No. of known species in N.A.		No. of unknown nymphs.	%-unknown	%-unknown
Aeschnidae:	124	36	29.0	71.0
Libellulidae:	126	51	40.4	59.6
Zygoptera:	115	56	48.6	51.4
Total:	365	143	39.3	60.7

It is the author's hope that this paper will, in addition to supplying information, act as a stimulant to students to work out these 39% of unknown life histories. Those interested in the study of matters ecological or in the taxonomy of the Odonata will find this a very fertile field indeed.

SOME NOTES ON EXAMINATION OF TYPES OF COLEOPTERA IN THE LECONTE AND CASEY COLLECTIONS.*

BY RALPH HOPPING,

Vernon, B. C.

During January, 1927, the writer visited the collections of LeConte, at Cambridge, Mass., and of Colonel Casey at the National Museum at Washington, D.C. In the conclusions presented I have been influenced by an extensive correspondence with Mr. H. C. Fall and Dr. E. C. Van Dyke as to the interpretation of certain species.

Many of Colonel Casey's species have erroneously been placed in the synonymy and many others have been considered as synonyms of the wrong species. Few have, heretofore, had an opportunity of examining the Casey types. A room has now been set aside in the United States National Museum exclusively for Colonel Casey's collection and library, and Mrs. Casey has donated funds for its proper housing in steel cases. I wish to express here my appreciation of the courtesies extended by Mrs. Casey and Mr. L. L. Buchanan, who has charge of the Casey collection.

SCARABAEIDAE

Aphodius Ill.

Two species of *Aphodius* have been recognized, from the west coast of Boreal America, namely: *Aphodius opaca* Lec., and *A. columbiensis* Wick. Prof. Wickham evidently was influenced by LeConte's published description of *opaca*, which states that the elytral striae are *not* punctate. Either this was a typographical error or a mistake in Dr. LeConte's manuscript, as the type of *A. opaca has*

*—Contribution from Division of Forest Insects, Entomological Branch, Dept. Agriculture, Ottawa.

the elytral striae puncate. *A columbiensis* therefore becomes a synonym of *A. opaca*, as this was apparently the only distinguishable difference.

CERAMBYCIDAE

Paraopsimus Champ. & Knull

Ent. News Vol. XXXVII, p. 205, 1926.

This new genus was established principally on Dr. LeConte's statement that the genus *Dicentrus* did *not* have clavate femora. Actually, the type *has* the femora clavate, as has a long series of *Dicentrus bluthneri* Lec., recently taken in British Columbia. The new species, *Paraopsimus birentatus*, therefore become *Dicentrus bidentatus* Champ & Knull.

I have examined the type, a single specimen from Oregon (?) in Mr. Knull's collection, which agrees perfectly with three specimens in the writer's collection from California, which for some years have been labelled "*Dicentrus* n. sp."

Leptura dehiscens Lec.

The type in the LeConte collection is a female. No. 2 is the male, but No. 3, 4 and 5 are typical specimens of *Leptura sanguinea* Lec.

Leptura canadensis Fab.

In the LeConte collection under *L. erythroptera* Kirby and *L. cinnamoptera* Hald., (both names written on the same label). Nos. 1, 2, 3, 5, and 6 are *Leptura canadensis*. No. 4 is *Leptura dehiscens* Lec and No. 7 is *Leptura nigrella* Say.

Stenocorus Fab.

Colonel Casey seems not to have recognized any of his *Stenocorus* as *S. vestitus* Hald.

Haldeman's types are supposed to be in the LeConte collection, but many of them are poorly designated and a few are missing. If the specimens called *S. vestitus* in the LeConte collection can be considered as Haldeman's species, the synonomy of Colonel Casey's species may be placed as follows:—

S. rufipennis Csy.=*vestitus* Hald.; *S. flaccidus* Csy.=*vestitus* Hald.; *S. pacificus* Csy.=*vittiger* Rand.; *S. hesperus* Csy.=*vittiger* Rand.; *S. tenellus* Csy.=*trivittatus* Say; *S. parviceps* Csy.=*trivittatus* Say; *S. plagiatus* Csy.=*nubifer* Lec.

S. oregonensis Csy., *brevicollis* Csy., and *aureatus* Csy. are, I think, good species, but the remainder of Casey's species may prove to be only color variations of *S. vestitus* Hald.

Gaurotes lecontei Csy.=*cressoni* Bland., female.

The type is a green specimen, instead of blue as described. *G. cressoni* is often found with a blue male and a green female in copulation.

Acmaeops Lec.

A. oblongus Csy. is a large female of *bivittatus* Say.

Leptacmaeops Csy.

In the Casey collection, *L. basalis* Lec.=*militaris* Lec.; *L. cuneata* Csy.=*militaris* Lec.; *L. temporalis* Csy.=*militaris* Lec.; *L. quadrinotata* Csy.=*militaris* Lec.; *L. dicroma* Csy.=*basalis* Lec.; *L. auricolis* Csy.=*basalis* Lec.; *L. intermedia* Csy. is a rubbed specimen of *subpilosa* Lec.; *L. pugetana* Csy.=*subpilosa* Lec.; *L. quadriceps* Csy.=*subpilosa* Lec.; *L. nitidipennis* Csy.=*subpilosa* Lec.

L. ligata Lec, in the Casey collection, *suturalis* Csy., and *alticola* Csy., all are *longicornis* Kby.

There are no entirely black males of *longicornis* in the Casey collection, although this is a very common form in nature.

Synaphaeta Thoms.

S. humeralis Csy.=*guexi* Lec.; *S. annulata* Csy.=*guexi* Lec.

These species can be distinguished from the specimen labelled *"guexi"* in the Casey collection only by size. *S. brevicollis* Csy. may possibly be distinct. All four species in the Casey collection are represented by only one specimen each.

Cyllene Newm.

C. angulifera Csy.=*infausta* Lec.

C. chara Say in the Casey collection is the species accepted as *decora* Oliv. by LeConte and represented by 15 specimens in the LeConte collection, all from Kansas.

C. genitiva Csy., *mediana* Csy., and *kansana* Csy. all are plain color variations of *decora* Oliv.

C. decora in the Casey collection appears to be *C. chara* Say as recognized by LeConte and also by Horn.

C. filicornis Csy.,=*crinicornis* Chev.

ANOBIIDAE

Ptilinus Geoff.

P. pruinosus Csy., *lobatus* Csy., and *flavipennis* Csy. are in my opinion good species. *P. acuminatus* Csy., is *basalis* Lec. *P. basalis* Lec. of Casey is not that species, but apparently new. It is possible that some of these species may prove to be sexes of some of the species previously described from one sex.

THE EPHEMEROPTERA OF JASPER PARK, ALTA.*

BY J. MCDUNNOUGH,

Ottawa, Ont.

I have recently had the pleasure of examining and determining the Ephemerid material collected by Prof. F. Neave and his assistants at Jasper Park, Alta., during the course of an investigation into the insect fauna of the lakes and rivers of this region conducted by the University of Manitoba.

Besides a quantity of nymphal material—which, on account of lack of association I was unwilling to determine further than to genus—there were a number of adults; as, up to the present, the Ephemerid species of this region have been entirely unknown and as some very interesting forms were disclosed, I append the following list of species which includes two new to science and one new record for our Canadian fauna.

Leptophlebia pallipes Hag. Maligne Lake, July 21.

Leptophlebia debilis Wlk. Beauvert Lake, Aug. 16.

Ephemerella (Eatonella) doddsi Needh. Maligne Lake, July 21; Medicine Lake, Aug. 14. Only females were taken but as far as can be told they appear to belong to this species.

Ephemerella tibialis McD. One ♀, Maligne Lake, Aug. 29; placed here on account of the long axillary cords.

Baetis parvus Dodds. Caledonia Cr., Aug. 20.

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

Siphlonurus occidentalis Eat. Jacques Lake, Aug. 26.

Ameletus subnotatus Eat. Maligne Lake, July 21. Females only. Rather more heavily spotted on forewings than southern Alta. specimens but presumably belonging to this species.

Ameletus velox Dodds. Maligne Lake, July 21. Females only.

Ameletus validus McD. Maligne Lake, July 21. Females only.

Ameletus similior n. sp.

♀. (in alcohol). Very similar to the preceding in size and coloration: thorax rather brighter red-brown and abdomen more definitely brown-ringed on posterior margin of segments; mid and hind legs somewhat lighter. Best distinguished by a mid-ventral row of dark heart-shaped ganglionic spots on abdomen which are entirely lacking in *validus*, and also by the smaller subanal plate which covers less than half of the tenth segment in the present species whilst in *validus* it nearly reaches to the posterior margin. Length of body and forewing 9 mm.

Holotype—♀, Jacques Lake, Jasper Park, Alta., Sept. 4, 1926 (F. Neave), No. 2665 in the Canadian National Collection.

Paratype—♀, same data.

There are several subimagos from Banff, Alta. in the Canadian National Collection, taken Sept. 7, which appear to belong to this species.

Ametropus neavei n. sp.

♀. (in alcohol). Head light brown, darker around the ocelli; prothorax dark brown with broad pale lateral edges; mesothorax light brown, tinged with darker brown anteriorly and with the posterior portion deep black-brown with a pale spot anterior to the scutellum. Abdomen dorsally brown with a broad pale area along the lateral margin and a double row of pale indistinct spots subdorsally which are more or less circular on anterior segments but elongate and tending to fork on the posterior ones, and almost absent on the paler brown ninth and tenth segments; ventrally the abdomen is light ochreous broadly tinged with brown laterally on the first eight segments, the posterior margin of the ninth segment shows a slight medio-ventral v-shaped slit, each lobe thus formed being convex but scarcely protruding to form an anal plate; setae three, of equal length, pale. Fore femur and tibia dark brown, tarsi pale, the two first joints slightly smoky; mid and hind femora deep yellowish, with an apical dark brown spot; tibiae and tarsi pale,. Wings hyaline with brown longitudinal nervures and pale indistinct cross-veins. Length of body 15 mm., of forewing 15 mm.

Holotype—♀, Old Fort Pt., Athabasca River, Jasper Park, Alta., July 25, 1926, (F. Neave); No. 2664 in the Canadian National Collection.

This is the first occurrence of this European genus in our North American fauna, the structural details agreeing excellently with Eaton's characterization (Mon. Pl. XXII).

Iron grandis McD. Maligne Lake, July 21, Aug. 10.

Iron longimanus Eat. Maligne Lake, July 21, Aug. 26; Medicine Lake, July 24.

Cinygma ramaleyi Dodds. Jacques Lake, Sept. 4:; Maligne Riv., Sept. 12.

Rhithrogena doddsi McD. Maligne Lake, July 28.

Rhithrogena brunnea Hag. Maligne Lake, July 21. I have identified a

small series as this species on account of the excellent agreement of the ♂ genitalia with Eaton's figure from the type (Pl. XXIV, fig. 43c), especially as shown on the left hand side; the strongly divergent apices of the penes and the large lateral spine are quite characteristic. The species is one of the largest of the group, equalling *flavianula* McD. in size and being considerably larger than *doddsi;* the above is the first Canadian record for the species.

THE SUBGENUS PLATYDERIDES IN NORTH AMERICA (COLEOPTERA).*

BY W. J. BROWN,

Ottawa, Ont.

The subgenus *Platyderides* was erected to include those species of *Aphodius* in which the side pronotal margins are explanate. The group is better known as Horn's series I-a. The genus *Aphodius* does not lend itself well to subdivision, consequently *Platyderides* is not sharply defined. The only character of key value in defining the group is the explanate pronotal side margin, but this character is lacking in *insolitus* and feebly developed in several others. The species are usually strongly shining and medium sized or large for the genus. The head is never very roughly sculptured or strongly tuberculate, and the spinules at the apex of the hind tibiae are always unequal. Sexual characters are well developed; they have been described in detail in the following pages because they are often of value in separating closely allied species.

As the following table will show, the species are not very homogeneous. With the exception of a few aberrant forms, they fall into three or four natural groups. The table includes twenty-one species and one subspecies. All of these have been associated with the group previously except those described as new and *luxatus*. The latter has been included for reasons given in the notes describing the species. Schmidt has included *luteolus* Horn in the subgenus, but it has been omitted from the present paper because it is not a member of the group.

Because of the rarity of the subgenus in collections, the author has been handicapped by lack of material; he was unable to study three species and only small series of other species were available. The rarity of the group is more apparent than real. The species are overlooked by collectors because their feeding habits are unknown. Hubbard (Proc. Ent. Soc. Wash., IV, 32, 1901) collected a specimen of *coquilletti* from a burrow of the kangaroo rat, and this is the only published record that gives a clue to the habits of the group. The author found several species common in Oklahoma. They never occurred in manure but were all found flying over meadows between four and five o'clock in the afternoon during the fall month. Mr. S. Criddle has recently taken four species at Aweme, Manitoba, in the nests of the pocket gopher, *Thomomys talpoides rufescens.*

In the table and notes that follow, a structure is sometimes described as being apparently impunctate. This term is used to describe a type of puncturation so fine that clean specimens and high magnification are necessary for its observation.

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

Mr. E. T. Cresson, Jr. kindly compared specimens of *brevicollis* and *haldemani* with the types and specimens of *punctissimus*, and *oklahomensis* with the type of *depressiusculus*. Mr. Nathan Banks compared specimens of *rudis, explanatus*, and *phaeopterus* with the types of those species. The author is indebted to Mr. Norman Criddle, Mr. S. Criddle, Mr. F. S. Carr, and Mr. J. B. Wallis for use of the material in their collections and to Prof. H. F. Wickham for a specimen of *iowensis*.

PLATYDERIDES Schmidt.

Platyderus Schmidt, Arch. Naturg., LXXIXA, fasc. 11, 122, 1913.
Platyderides Schmidt, l. c., LXXXIIA, fasc. 1, 99, 1916.
Platyderides Schmidt, Das Tierreich, lief. 45, 43, 1922.

KEY TO SPECIES.

1. Clypeus with an acute tooth on each side of emargination; basal pronotal margin strongly oblique on each side near the hind angle except in *luxatus* 2.
   Clypeus angulate or broadly rounded on each side of emargination; basal pronotal margin not strongly oblique near the hind angles except in *ochreipennis* 4.
2. Pronotum without basal marginal line; humeri obtuse; elytral intervals finely punctate; length 6.5-7 mm. ..... 2. *rudis* Lec.
   Pronotum with basal marginal line ..... 3.
3. Humeri distinctly dentiform; elytral intervals very finely and sparsely punctate; length 3.5-3.7 mm ..... 1. *luxatus* Horn.
   Humeri obtuse; elytral intervals minutely rugose, coarsely punctured; length 6.5 mm. ..... 3. *coquilletti* Linell.
4. Clypeus distinctly but obtusely angulate on each side of emargination; pronotum rather closely punctate throughout, with basal marginal line; head and pronotum largely black ..... 5.
   Clypeus rounded on each side of emargination; other characters variable .. 7.
5. Pronotal margins broadly explanate; elytra brownish yellow; length 6-8.5 mm. ..... 4. *explanatus* Lec.
   Pronotal margins not broadly, less strongly explanate ..... 6.
6. Elytra reddish yellow; length 7 mm. ..... 5. *phaeopterus* Lec.
   Elytra black; length 7-8 mm. ..... 5a. *phaeopterus canadensis* Garn.
7. Pronotum not or feebly impressed near the hind angles, with basal marginal line, very distinctly and rather closely punctate throughout. ..... 8.
   Pronotum with a distinct impression before each hind angle, basal marginal line entirely absent except in *brevicollis*, impunctate or very finely and sparsely punctate except at base and sides ..... 12.
8. Color uniformly pale reddish brown ..... 6. *russeus* n. sp.
   Head and pronotum largely blackish ..... 9.
9. Elytra pale brownish-yellow; length 4-4.5 mm ..... 9. *thomomysi* n. sp.
   Elytra red or reddish brown; size usually larger ..... 10.
10. Clypeus granulate near anterior margin; pronotal sides not explanate ..... 10. *insolitus* n. sp.
    Clypeus punctate throughout; pronotal sides explanate ..... 11.
11. Hind tarsus distinctly longer than the hind tibia; ninth and tenth elytral intervals strongly convex ..... 7. *leptotarsis* n. sp.
    Hind tarsus and tibia subequal in length; ninth and tenth elytral intervals feebly convex ..... 8. *aquilonarius* n. sp.

12. Anterior portion of clypeus granulate ..... 13.
Anterior portion of clypeus punctate or apparently impunctate ..... 15.
13. Color pale red throughout ..... 11. *criddlei* n. sp.
Head and pronotum largely black; elytra pale to dark reddish brown .... 14.
14. Elytral intervals and pronotum in front at middle distinctly punctulate; length 7.5-8 mm. ..... 13. *depressiusculus* Schm.
Elytral intervals and pronotum in front at middle impunctate; length 7.2-8.5 mm. ..... 12. *iowensis* Wickh.
15. Pronotum with base very distinctly sinuate on each side, the sinuation obliterating the hind angles, the punctures fine at middle, coarse on the sides; elytra reddish yellow, the intervals with numerous fine punctures; length 6.5 mm. ..... 14. *ochreipennis* Horn.
Pronotal base not strongly sinuate on each side, the hind angles broadly rounded but distinct ..... 16.
16. Elytral intervals distinctly punctate; pronotum usually punctate throughout 17.
Elytral intervals and pronotum in front at middle impunctate or apparently so ..... 21.
17. Elytra pale reddish yellow; pronotal sides strongly explanate; length 5.5-6 mm. ..... 15. *umbricollis* Fall.
Elytra darker, red or reddish brown ..... 18.
18. Pronotal side margins more strongly explanate, rather broadly and distinctly reddish brown ..... 19.
Pronotal side margins less strongly explanate; pronotum black throughout the sides sometimes indistinctly paler near the margins; anterior tibial spur of male laterally compressed ..... 20.
19. Punctures of elytral intervals very fine; elytra red or pale reddish brown; anterior tibial spur of male not laterally compressed; length 5.6-7 mm. ..... 17. *oklahomensis* n. sp.
Punctures of elytral intervals fine; elytra dark reddish brown; anterior tibial spur of male laterally compressed; length 4.5-6 mm..... 16. *punctissimus* n. sp.
20. Sutural interval impunctate; elytra reddish brown ..... 18. *talpoidesi* n. sp.
Sutural interval distinctly punctulate; elytra very dark reddish brown .... 19. *socialis* n. sp.
21. Clypeus roughly punctate on anterior half; elytra dark brown, the striae strongly impressed: length 8 mm. ..... 20. *brevicollis* Lec.
Head apparently impunctate; pronotum with numerous coarse punctures at base and sides; elytral striae very feebly impressed ..... 21. *haldemani* Horn.

1. **Aphodius luxatus** Horn.

A. luxatus Horn, Trans. Am. Ent. Soc., XIV, 46, 1887.
A. luxatus Schmidt. Das Tierreich, lief. 45, 335, 1922.

There is one female of this species in the collection at hand. The species is not closely allied to any other in the subgenus, but is placed here because the side pronotal margins are feebly and narrowly, but distinctly, explanate and because it is equally out of place in any other group of the genus. It differs from all other species of the subgenus in the following characters: humeri dentate, elytral intervals strongly convex on apical fourth, length 3.5-3.7 mm. In addition, the ninth elytral interval is strongly convex throughout. The pronotum

is rather coarsely and closely, regularly punctate throughout. The head and pronotum are black, and the elytra are rather dark reddish brown. The species was described from southern California and Arizona. The specimen at hand is from Del Monte, California (L. S. Slevin).

2. **Aphodius rudis** Lec.

A. rudis LeConte, Bull. U. S. Geol. Surv., IV, 2, 458, 1878.
A. rudis Horn, Trans. Am. Ent. Soc., XIV, 31, 1887.
A. rudis Schmidt, Arch. Naturg., LXXIXA, fasc. 11, 123, 1913.
A. rudis Schmidt, Das Tierreich, lief. 45, 49, 1922.

This species is represented in the collection at hand by two specimens of each sex from the Pinal Mountains and Globe, Arizona (D. K. Duncan). In *rudis* the pronotal base is not margined, the elytral intervals are finely and sparsely punctate, and the color is uniformly brownish red. *A. coquilletti* is described as having the pronotum distinctly margined at base, the elytral intervals minutely rugose and coarsely punctured, and the pronotal sides and base and the elytral suture narrowly black. These characters should readily separate the species. *A. rudis* was described from Colorado and has been recorded from southern Arizona.

The sexual characters of the species are as follows:

Male. Anterior tibia squarely truncate at apex, the inner angle slightly prolonged and very acute; tibial spur short, stout, strongly directed caudad, the apex incurved. Minor spur of middle tibia almost half as long as the major, bluntly pointed.

Female. Anterior tibia normal in form, the spur less stout, not directed caudad, more acute at apex. Minor spur of middle tibia as in the male.

3. **Aphodius coquilletti** Linell.

A. coquilletti Linell, Proc. U. S. Nat. Mus., XVIII, 722, 1896.
A.coquilletti Schmidt, Das Tierreich, lief. 45, 50, 1922.

This species is not represented in the collection at hand. It was described from Los Angeles, California, and should be distinguished readily from *rudis* by the characters given in the notes on the latter species.

4. **Aphodius explanatus** Lec.

A. explanatus LeConte, Bull. U. S. Geol. Surv., IV, 2, 457, 1878.
A. explanatus Horn, Trans. Am. Ent. Soc., XIV, 30, 1887.
A. explanatus Hamilton, Can. Ent., XXIII, 61, 1891.
A. explanatus Schmidt, Arch, Naturg., LXXIXA, fasc. 11, 122, 1913.
A. explanatus Schmidt, Das Tierreich, lief. 45, 44, 1922.

This species is represented in the collection at hand by six males and four females from the following localities: Creede, Colorado (S. J. Hunter); Aweme, Manitoba (N. Criddle); Moose Jaw, Saskatchewan; Olds, Medicine Hat, and Cowley, Alberta (T. N. Willing, F. S. Carr, and R. N. Chrystal respectively); Nelson, British Columbia (J. Fletcher). The female type of *explanatus*, the only specimen known to LeConte and Horn, was described as measuring 8.5 mm. and as having the mesosternal intercoxal process carinate. The specimens at hand vary from 6 to 8 mm. in length. The intercoxal carina shows great and unusual variation. In two of the females it is strongly developed; in one female it is quite short but distinct; in one female and all males there is no trace of a carina. There is also some variation in the width of the explanate pronotal margins, but in all specimens these margins are wider and more strongly explanate than in *phaeopterus*. The species has been confused with *phaeopterus*

in collections, but may be known by the pronotal character noted above, by the much different sexual characters of the male, and by the color of the elytra. The elytra of *explanatus* are brownish yellow; those of *phaeopterus* are pale reddish brown. The type locality of *explanatus* is Colorado.

The sexual characters of the species are as follows:

Male. Anterior tibial spur very stout, parallel, slightly wider near the apex which is suddenly incurved and bluntly pointed. Minor spur of middle tibia about half as long as the major, stout, strongly curved, the apex bluntly pointed.

Female. Anterior tibial spur shorter, very slender, the apex very acute. Minor spur of middle tibia more than half as long as the major, slender, not curved, the apex very acute.

5. **Aphodius phaeopterus** Lec.

A. phaeopterus LeConte, Bull. U. S. Geol. Surv., IV, 2, 456, 1878.
A. phaeopterus Horn, Trans. Am. Ent. Soc., XIV, 31, 1887.
A. phaeopterus Schmidt, Arch. Naturg., LXXIXA, fasc. 11, 122, 1913.
A. phaeopterus Schmidt, Das Tierreich, lief. 45, 45, 1922.

Of this species, one specimen of each sex is at hand. They were collected in Kalmath Co., Oregon (F. W. Nunenmacher). The species is similar to *explanatus* but can be separated readily by the characters given in the notes describing that species. It was described from Atlanta, Idaho, and has been recorded from Washington Territory and Montana.

The sexual characters are as follows:

Male. Anterior tibial spur stout, long, rather strongly curved, the apex acute. Minor spur of middle tibia about one-third as long as the major, very stout, abruptly incurved at apex. Middle femur with many hairs near posterior margin. Posterior femur with large patch of hairs on posterior half near trochanter.

Female. Anterior tibial spur shorter, slender, very feebly curved. Minor spur of middle tibia about half as long as the major, slender, acute at apex. Middle and posterior femora with only a few scattered hairs.

5a. **Aphodius phaeopterus canadensis** Garn.

A. canadensis Garnett, Can. Ent., LII, 139, 1920.
A. canadensis Brown, Can. Ent. LIX, 162, 1927.

This form cannot be separated from the preceding by any character except color. It is therefore considered a variety of *phaeopterus,* and as its range is more northern, it is probably worthy of a name. Its group and specific characters are incorrectly given in the original description. The form was described from Cranbrook and Crow's Nest, British Columbia. Among the four males and three females at hand are examples from both the localities cited above, from Chase, British Columbia (W. B. Anderson), and from Waterton, Alberta (H. L. Seamans).

6. **Aphodius russeus** n. sp.

Length 5.7 mm.; width 2.7 mm. Oblong, moderately convex and elongate, parallel. Uniformly pale reddish brown, strongly shining.

Head two-thirds as wide as pronotum; moderately convex; with three very feeble tuberosities; rather closely punctate throughout, the punctures rather coarse but becoming fine at middle. Clypeus with a broad, shallow emargination,

the angle on each side very broadly rounded. Genae broadly rounded, moderately prominent, fimbriate.

Pronotum two-thirds as long as wide; the angles very obtuse; the sides narrowly and feebly explanate, scarcely arcuate; base arcuate, the marginal line entire, very fine. Pronotal disc without concavities near the hind angles; finely and rather closely punctate throughout, with very coarse punctures which are sparse at middle, dense near side margins, and absent at middle on anterior third; median line narrowly impunctate on basal half. Scutellum closely punctate basally.

Elytra at base equal in width to pronotum, the sides parallel, the humeri obtuse. Elytral disk finely striate; the striae with fine, close punctures; intervals flat, very finely and sparsely punctulate.

Mesosternum alutaceous, the sides punctate, the intercoxal process not carinate. Metasternum punctate throughout, the punctures moderately fine and sparse, the sides alutaceous. Abdomen with feeble, coarse, rather close punctures. Ventral face of anterior femur with a row of hair bearing punctures. Anterior tibia very strongly tridentate, not or feebly crenate above the upper tooth. Middle and hind femora finely and sparsely punctulate, each with a short row of coarse punctures near apex. First segment of hind tarsus very slightly shorter than the three following.

Male. Anterior tibial spur moderately stout, very strongly incurved, the apex very acute. Minor spur of middle tibia about one-third as long as the major, the apex obliquely truncate and with the inner angle slightly produced. Middle femur with an elongate patch of yellow hairs on posterior margin. Posterior femur with a patch of similar hairs near trochanter.

Holotype.—♂, Payne Co., Oklahoma, October 5, 1926, (W. J. Brown); No. 2638 in the Canadian National Collection, Ottawa.

Paratype—1 ♂, Phillips Co., Kansas.

This species differs from the other uniformly reddish species of the subgenus in being more strongly punctate, in having the lateral pronotal margins feebly and narrowly explanate, in lacking pronotal impressions, and in the sculpture of the clypeus. In the pronotal characters, it resembles *phaeopterus*.

7. **Aphodius leptotarsis** n. sp.

Lenth 4.3-4.5 mm.; width 2 mm. Oblong, moderately convex and elongate, parallel. Head, pronotum, and ventral thoracic sclerites black; apical margin of clypeus and lateral pronotal margins narrowly reddish yellow; strongly shining.

Head three-fourths as wide as pronotum; moderately convex; the three tuberosities scarcely evident; rather coarsely and closely punctate. Clypeus broad- and broadly rounded; the sides feebly arcuate. Genae obtuse, moderately prominent, fimbriate.

Pronotum almost three-fourths as long as wide; the front angles broadly rounded; the hind angles feebly obtuse, rather narrowly rounded; sides broadly, distinctly but not strongly explanate, scarcely arcuate; base arcuate, feebly sinuate near the hind angles, the marginal line strong and entire. Pronotal disk without concavities near the hind angles; puncturation intermixed, the smaller punctures very fine, sparse; the larger punctures coarse, close on the explanate

margins, absent from anterior third of disk at middle, rather sparse elsewhere. Scutellum punctate basally.

Elytra at base equal in width to pronotum, the sides parallel, the humeri obtuse. Elytral disk finely striate; the striae rather coarsely and closely punctate; discal intervals feebly convex, the ninth and tenth strongly so; intervals impunctate, their margins more or less crenated by the transverse strial punctures.

Mesosternum alutaceous at middle, the sides closely punctured, the intercoxal process not carinate. Metasternum with a few punctures at middle, the sides alutaceous and sparsely punctate. Abdomen alutaceous, indistinctly punctate. Ventral face of anterior femur with a row of hair bearing punctures. Anterior tibia very strongly tridentate, the margin serrate above the upper tooth. Middle and posterior femora each with a few coarse punctures near apex. Hind tarsus distinctly longer than the hind tibia, the first segment of the former subequal in length to the two following.

Male. Anterior tibial spur stout, parallel, strongly curved; the apex incurved, bluntly pointed. Minor spur of middle tibia about half as long as the major, stout, the apex squarely truncate and with the inner angle produced. Middle femur with a few hairs on the posterior margin. Posterior femur with a small patch of yellow hairs on posterior margin near trochanter.

Holotype.—♂, Northwest Territories, Bell Collection; No. 2639 in the Canadian National Collection, Ottawa.

Paratype—1 ♂, Riley Co., Kansas, April 28.

This species resembles only *aquilonarius*. The strongly convex elytral intervals, the crenate intervals, and the long hind tarsi of *leptotarsis* are remarkable characters; they readily separate the two species. The holotype of *leptotarsis* was collected long ago and probably came from a locality which is now included in Alberta or Saskatchewan.

8. **Aphodius aquilonarius** n. sp.

Length 4.7 mm.; width 2.2 mm. Oblong, moderately convex and elongate, parallel. Head and pronotum black, the anterior margin of clypeus and lateral margins of pronotum broadly reddish yellow; elytra and ventral thoracic sclerites dark reddish brown; abdomen and legs reddish yellow; strongly shining.

Head three-fourths as wide as pronotum; moderately convex; with three feeble tuberosities; rather closely punctate, the punctures fine at middle, coarser on the sides and genae. Clypeus broadly emarginate, the emargination rather deep; the angle on each side obtuse, broadly rounded; sides feebly arcuate. Genae rectangular, prominent, fimbriate.

Pronotum three-fourths as long as wide; the angles broadly rounded, the hind angles very obtuse; sides broadly, very distinctly but not strongly explanate, scarcely arcuate, conspicuously fimbriate with short yellow hairs; base arcuate, distinctly sinuate on each side near middle, the marginal line strong and entire. Pronotal disk without trace of concavities near the hind angles; puncturation intermixed; the smaller punctures fine, sparse at middle, closer on the sides; the larger punctures coarse, moderately sparse on basal third and sides, absent from remainder of disk. Scutellum punctate basally.

Elytra at base slightly narrower than pronotum, the sides parallel, the humeri obtuse. Elytral disk finely striate; the striae rather closely, finely punc-

tate; intervals very feebly convex, distinctly but very finely and sparsely punctate.

Mesosternum alutaceous, the sides densely punctate, the intercoxal process not carinate. Metasternum finely and sparsely punctate, the sides alutaceous. Abdomen alutaceous, indistinctly punctate. Ventral face of anterior femur with two rows of hair bearing punctures. Anterior tibia very strongly tridentate, the margin crenate above the upper tooth. Middle and posterior femur sparsely and indistinctly punctulate. Hind tarsus subequal in length to the hind tibia; the first segment of the former subequal in length to the two following.

Male. Anterior tibial spur stout, strongly curved, the apex acute. Minor spur of middle tibia half as long as the major, the apex squarely truncate and with the inner angle produced. Middle and hind femora with only a few scattered hairs.

Holotype—♂, Saskatoon, Saskatchewan, May 9, 1925; No. 2640 in the Canadian National Collection, Ottawa.

This species is easily distinguished from all except *leptotarsis* by its small size, color, and tuberculate head. The characters of the present species and *leptotarsis* are compared in the notes following the description of the latter.

9. **Aphodius thomomysi** n. sp.

Length 4-4.5 mm.; width 1.8-2 mm. Oblong, moderately convex and elongate, parallel. Head brown or blackish, the margins and sometimes the entire clypeal region brownish yellow; pronotum brown or black, the sides broadly brownish yellow; elytra and legs pale brownish yellow; ventral surface dark brown; surface moderately strongly shining.

Head about three-fifths as wide as pronotum; moderately convex; three very feeble tuberosities evident on the frontal suture; finely, deeply and moderately closely punctate throughout; the punctures of the vertex finer; clypeus near apex sometimes roughened and subgranulate. Clypeus broadly and shallowly emarginate, the angle on each side broadly rounded; the sides strongly divergent, scarcely arcuate. Genae very broadly rounded, not at all prominent, fimbriate.

Pronotum about three-fifths as long as wide; moderately convex; the anterior angles very obtuse and broadly rounded; the side margins feebly and narrowly explanate, converging in apical half, subparallel basally, not sinuate before the posterior angles which are obtuse and narrowly rounded, the disk with a distinct depression before each hind angle; base arcuate, very feebly sinuate on each side of middle, the marginal line fine but distinct. Pronotal disk with intermixed puncturation, the smaller punctures fine, moderately sparsely and regularly placed throughout; the larger punctures moderately coarse, very sparse in front at middle, moderately close at base and on the side, confluent in the depressions of the hind angles. Scutellum finely punctured basally.

Elytra at base very slightly narrower than the pronotum, slightly wider posteriorly; humeri obtuse. Elytral disk finely and sharply striate, the striae with fine, close punctures; intervals almost flat, finely and sparsely punctulate.

Mesosternum feebly strigose at middle, the sides punctured, the intercoxal process not carinate. Metasternum finely and sparsely punctate at middle; the sides alutaceous, more coarsely and closely punctate. Abdomen alutaceous, finely punctate. Ventral face of anterior femur indistinctly, moderately closely

punctate, moderately hirsute. Anterior tibia very strongly tridentate, the margin very feebly crenate above the upper tooth. Middle and hind femora very finely and sparsely punctulate, each with a few coarse punctures near apex. First segment of posterior tarsus equal in length to the two following.

Male. Anterior tibial spur stout, rather strongly curved. Minor spur of middle tibia less than half as long as the major, not acute. Middle femur with sparse yellow hairs near posterior margin. Posterior femur with similar hairs on posterior third except near apex.

Female. Anterior tibial spur more slender and less strongly curved. Minor spur of middle tibia more than half as long as the major, the apex acute. Middle and posterior femora with a few inconspicuous hairs near posterior margins.

Holotype— ♂, Aweme, Manitoba, November 2, 1927, (S. Criddle); No. 2766 in the Canadian National Collection, Ottawa.

Allotype.— ♀, same data as holotype.

Paratypes.—8 ♂, 3 ♀, same data.

The color of this species readily distinguishes it from the others in this section of the subgenus. It is most closely allied to *insolitus* but differs greatly in sculpture and in numerous other characters. It lacks the long tarsi and strongly convex ninth and tenth elytral intervals of *leptotarsis* and the fimbriate pronotal margins of *aquilonarius*. The species is the smallest in the subgenus and has the explanate pronotal margins more feebly developed than any of the closely allied species except *insolitus*. The species occurs in nests of the pocket gopher.

10. **Aphodius insolitus** n. sp.

Length 4.5-5.4 mm.; width 2.1-2.7 mm. Oblong, moderately convex and elongate, parallel. Head black, the anterior margin and sometimes the entire clypeal region reddish yellow; pronotum black, the anterior angles broadly and sometimes the lateral margins narrowly reddish yellow; scutellum and elytra red or reddish brown; ventral thoracic sclerites black or dark reddish bown; abdomen and legs pale reddish brown; surface strongly shining.

Head about three-fifths as wide as pronotum; moderately convex; not tuberculate; apical half of clypeus feebly and sparsely granulate; remainder of head finely and rather closely punctate. Clypeus broadly and shallowly emarginate, the angle on each side obtuse and moderately rounded; the sides strongly divergent posteriorly, feebly arcuate. Genae very broadly rounded, not at all prominent, fimbriate.

Pronotum about three-fifths as long as wide; moderately convex; the anterior angles very obtuse and broadly rounded; the side margins not explanate, converging in apical third, subparallel basally, usually more or less sinuate before the posterior angles which are obtuse and narrowly rounded, the disk with a broad shallow depression near each posterior angle when the lateral sinuation is well developed; base arcuate, the marginal line fine but distinct. Pronotal disk with intermixed puncturation; the smaller punctures very fine, sparsely and regularly placed throughout the disk; the larger punctures very coarse and shallow, very irregularly placed throughout, dense near the hind angles, close on the sides, sparse elsewhere. Scutellum finely punctate basally.

Elytra at base very slightly narrower than the pronotum, slightly broader

posteriorly; humeri obtuse. Elytral disk finely and sharply striate, the striae with fine, close punctures; intervals almost flat, very finely and sparsely punctulate.

Mesosternum strigate at middle, very closely punctate on each side, the intercoxal process not carinate. Metasternum finely and sparsely punctate at middle, the sides more closely punctate and alutaceous. Abdomen alutaceous, finely punctate. Ventral face of anterior femur densely and roughly punctate, moderately hirsute. Anterior tibia very strongly tridentate, the margin crenate above the upper tooth. Middle and hind femora very sparsely and finely punctulate, each with a few coarse punctures near apex. First segment of posterior tarsus almost equal in length to the three following.

Male. Large punctures less numerous on apical half than on basal half of pronotum. Anterior tibial spur very stout. Minor spur of middle tibia less than half the length of the major, the apex bluntly pointed. Middle femur with sparse yellow hairs. Posterior femur with patch of similar hairs on posterior margin near trochanter.

Female. Large punctures not less numerous on apical half of pronotum. Anterior tibial spur slender. Minor spur of middle tibia more than half as long as the major, the apex acute. Middle and posterior femora with a few scattered hairs.

Holotype—♂, Payne Co., Oklahoma, October 26, 1926, (W. J. Brown); No. 2637 in the Canadian National Collection, Ottawa.

Allotype—♀, same data as the holotype.

Paratypes—1 ♂, 5 ♀, Payne Co., Oklahoma, collected on various dates between October 22 and November 21. (W. J. Brown).

This species falls in couplet 5, series I-d, of Horn's table, but differs from the species of that couplet in form, sculpture, and color. Although *insolitus* lacks explanate pronotal sides, it must be placed in *Platyderides*, for its general habitus, sculpture, and pronotal depressions are characteristic of certain species of the subgenus. It is remarkable for its small genae and the form and sculpture of its pronotum.

11. **Aphodius criddlei** n. sp.

Length 7.4-8 mm.; width 3.2-3.6 mm. Oblong, moderately convex and elongate, parallel. Reddish yellow throughout, the head, pronotum, and tibiae very slightly darker; strongly shining.

Head two-thirds as wide as pronotum; moderately convex; feebly tritubercule; apical three-fourths of clypeus impunctate but with rather close, very distinct granules; remainder of head finely and sparsely punctate. Clypeus feebly and broadly emarginate, the angle on each side very broadly rounded. Genae narrowly rounded, very prominent, fimbriate.

Pronotum two-thirds as long as wide; the angles very broadly rounded; the sides broadly and very strongly explanate, feebly arcuate; base arcuate, feebly sinuate on each side, without marginal line. Pronotal disk with a concavity before each hind angle, the basal third and sides with large, shallow punctures which are sparse at middle and dense near the hind angles. Scutellum closely punctate basally.

Elytra at base slightly narrower than the pronotum, the sides parallel; humeri obtuse. Elytral disk finely striate; the striae with fine, close punctures;

intervals almost flat, apparently impunctate, but with very fine and sparse punctules.

Mesosternum alutaceous, the sides closely punctate, the intercoxal process not carinate. Metasternum with the sides alutaceous and feebly punctate. Abdomen alutaceous, feebly and sparsely punctate. Ventral face of anterior femur with two irregular rows of coarse, hair bearing punctures. Anterior tibia very strongly tridentate, the margin serrate above the upper tooth. Middle and hind femora each with a row of coarse punctures near apex. First segment of posterior tarsus distinctly shorter than the three following.

Male. Anterior tibial spur stout, moderately curved, acute at apex. Minor spur of middle tibia about half as long as the major, suddenly dilated just before the apex which is squarely truncate. Posterior margin of middle femur broadly hairy. Posterior femur with a patch of yellow hairs near the trochanter.

Female. Anterior tibial spur slender, moderately curved, acute at apex. Minor spur of middle tibia about half as long as the major, bluntly pointed at apex. Middle and hind femora with a few scattered hairs.

Holotype—♂, Aweme, Manitoba, July 22, 1922. (N. Criddle); No. 2641 in the Canadian National Collection, Ottawa.

Allotype.—♀, Aweme, Manitoba, August 28, 1927, at light, (N. Criddle).

Paratypes.—4♂, Aweme, Manitoba, June 25, 1915, ((N. Criddle); Edmonton, Alberta, May 24, 1917, (F. S. Carr); Saskatchewan, Canada (?); Rosebank, Manitoba, July 28, 1925, (J. B. Wallis).

Because of its uniform reddish color, this species has been labeled *haldemani* in collections. It differs from that species in the sculpture of its head and thorax and in its secondary sexual characters. The granulate clypeus, uniformly red color, and sexual characters render the species very distinct.

12. **Aphodius iowensis** Wickh.

A. iowensis Wickham, Psyche, XX, 28, 1913.

This species is represented in the collection at hand by 79 specimens from Aweme, Manitoba (S. Criddle), Iowa City, Iowa (H. F. Wickham), and Lawrence, Kansas ((W. J. Brown). It is very similar to *brevicollis*, but differs in having the anterior part of the clypeus impunctate and very distinctly granulate. In this character it resembles only the uniformly red *criddlei*, *depressiusculus*, and *insolitus*. The color of the elytra vary from pale to very dark reddish brown. The species was described as having the mesosternum carinate, but there is no trace of a carina in any of the species at hand. The species was described from Lake Okoboji, Iowa.

The sexual characters are as follows:

Male. Anterior tibial spur stout, strongly curved, rather bluntly pointed. Minor spur of middle tibia almost half as long as the major, stout, dilated at the apex which is almost squarely truncate. Middle femur with close hairs on posterior margin. Hind femur on basal half of posterior margin and hind trochanter with close hairs.

Female. Anterior tibial spur slender, moderately curved, the apex very acute Minor spur of middle tibia about half as long as the major, slender, bluntly pointed. Middle femur and posterior femur and trochanter with a few scattered hairs.

13. **Aphodius depressiusculus** Schm.

A. marginatus LeConte, Bull. U. S. Geol. Surv., IV, 2, 456, 1878.
A. marginatus Horn, Trans. Am. Ent. Soc., XIV, 32, 1887.
A. depressiusculus Schmidt, Deutsche Ent. Zeit., 201, 1907.
A. depressiusculus Schmidt, Arch. Naturg., LXXIXA, fasc. 11, 123, 1913.
A. depressiusculus Schmidt, Das Tierreich, lief. 45, 46, 1922

This species is not represented in the collection at hand. It was associated with *brevicollis* by Horn. Mr. E. T. Cresson, Jr., has informed the author that the type has the clypeal sculpture of *iowensis*. The granulate clypeus and punctulate elytral intervals should therefore separate it from all other species except the much smaller and very distinct *insolitus*. The species was described from eastern Nevada.

14. **Aphodius ochreipennis** Horn.

A. ochreipennis Horn, Trans. Am. Ent. Soc., III, 295, 1871.
A. ochreipennis Horn, l. c., XIV, 33, 1887.
A. ocheipennis Schmidt, Arch. Naturg., LXXIXA, fasc. 11, 122, 1913.
A. ochreipennis Schmidt, Das Tierreich, lief. 45, 45, 1922.

This species is not represented in the collection at hand. It should be recognized readily by the form of the pronotum which Horn describes as having the basal margin very obliquely sinuate on each side, the hand angles being obliterated. In this character, *rudis* and *coquilletti* approach the present species, but it differs from them in having the clypeus broadly rounded on each side of the emargination. The species was described from Owen's Valley, California.

15. **Aphodius umbricollis** Fall.

A. umbricollis Fall, Trans. Am. Ent. Soc., XXXIII, 245, 1907.
A. umbricollis Schmidt, Das Tierreich, lief. 45, 50, 1922.

The collection at hand contains a single female of this species from El Paso, Texas. Its reddish yellow elytra readily distinguish it from the other species with similar pronotal and elytral sculpture. It is described as having the mesosternum carinate, but no trace of a carina exists in the specimen at hand. The species was described from El Paso, Texas and Albuquerque, New Mexico.

(To be continued)

A NEW SPECIES OF CRICOTOPUS WITH A KEY TO THE GENUS (DIPT. CHIRONOMIDAE).*

BY G. STUART WALLEY,
Ottawa, Ont.

Cricotopus brunnicans n. sp.

Female. Length 1.5 mm., thorax and abdomen dark brownish black, the latter without lighter bands. Legs fuscous brown, all tibiae with broad pale bands.

Antenna, front and palpi dull blackish brown. Scutellum dull black, remainder of dorsum and metanotum dark brownish black, shining; pleura dark brownish. Coxae, femora, bases and apices of tibiae dark brown, each tibia with a broad fairly well defined dirty white band beginning at basal one fourth and extending to apical one third of tibia. All legs with subappressed fuscous hairs in length about equal to the diameter of the joint which bears them; leg hairs pale yellowish in region of the pale tibial bands. Anterior wing veins brownish; entire membrane infuscated. Halteres with base of stalk brownish, apex and knob pale lemon yellow.

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

Basal abdominal tergite shining brownish and somewhat transparent in basal region above; remainder of tergites dull black. Genital valves pale yellow; abdominal hairs brownish.

Holotype—♀, Saskatoon, Sask., June 23, 1926, (K. M. King); No. 2554 in the Canadian National Collection, Ottawa.

The following key based on that of Johannsen and specimens in the Canadian National Collection will serve to separate the North American species of the genus.

KEY TO THE NORTH AMERICAN SPECIES OF CRICOTOPUS

1. Mid and hind femora with at least the apical halves black ..... 2.
   Mid and hind femora for the most part yellow or white ..... 9.
2. Abdominal segments with broad pale fasciae or if not then the segments with narrow white posterior margins ..... 3.
   Abdominal segments entirely dark except the first which is somewhat brownish and transparent ..... *brunnicans* n. sp.
3. Abdominal segments with narrow white posterior margins; front metatarsus slightly more than one fourth shorter than its tibia ..... *tremulus* L.
   Abdominal segments with wide white or yellow fasciae ..... 4.
4. Abdomen with the first, most of third, half of fifth and posterior margins of second and fourth segments yellow ..... *geminatus* Say.
   Abdomen not marked in this manner ..... 5.
5. Abdomen with basal two segments entirely yellow, remaining segments wholly black ..... *slossonae* Malloch.
   Abdomen not marked in this manner ..... 6.
6. Front metatarsus one half as long as front tibia ..... 7.
   Front metatarsus two thirds as long as front tibia ..... 8.
7. Abdomen with yellow fasciae on segments one, four and seven ..... *trifasciatus* var. *tricinctus* Meig.
   Abdomen with yellow fasciae on segments one, four and five .. *exilis* Joh.
8. Abdomen with yellow fasciae on segments one and four .... *bicinctus* Meig.
   Abdomen with segments one and two and apices of three and four yellow ..... *varipes* Coq
9. First, fourth and seventh abdominal segments yellow .. *trifasciatus* Panzer.
   Abdomen not marked in this manner ..... 10.
10. Front tarsi with long hairs; abdomen with basal segment and posterior margins of others yellow ..... *flavibasis* Malloch.
    Front tarsi without long hairs ..... 11.
11. Abdominal segments with yellow posterior margins; front metatarsus one half as long as its tibia ..... *sylvestris* Fab
    Abdominal segments with brown posterior margins; front metatarsus two thirds as long as its tibia, (West Indies) ..... *debilis* Williston.

NEW SPECIES OF THE GENUS BRYCHIUS. (COLEOPTERA).

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In August, 1925 a couple of days were spent in the vicinity of Pincher Creek, collecting. The prospects were so promising that an attempt has been made each year since to do a little collecting in this and other parts of the Crows Nest Pass. To date the results, especially among the aquatic beetles, have been most gratifying. Among the species taken are found *Amphizoa planata* Van Dyke, *Agabus rectus* Lec., *Oreodytes yukonensis* Fall, *Oreodytes septentrionalis* Gyll., *Oreodytes congruus* Lec., *Oreodytes crassulus* Fall, *Oreodytes quadrimaculatus* Horn, *Hydrobius scabrosus* Horn, *Helmis inornata* Schaeffer and *Helmis corpulenta* Horn. Among other families of Coleoptera, interesting species have been taken but the emphasis in collecting was placed on the aquatic species. The most interesting capture consisted of a series of nine specimens belonging to the genus *Brychius*. At first this was thought to be *hornii* Cr., but the size of the specimens precluded this determination. It was found very difficult to secure material of any species in the genus for comparison; in my own collection is a series of three *Brychius elevatus* Panz. from France and until Dr. Chittenden mentioned my difficulties to the officials of the United States National Museum, there seemed to be no material that could be obtained. To this institution I am greatly indebted for material including *elevatus* Panz., *hornii* Cr., compared with the type material and three specimens of still another species of *Brychius*. I am greatly indebted to Mr. Barber for the notes he has made on the genus *Brychius*, on the species *hornii* Cr., and on the position of *parvulus* Roberts. To Mr. L. L. Buchanan also who compared the U.S.N.M. material in *hornii* Cr., with the type material and supplied me with notes, I am greatly indebted.

The genus *Brychius* is restricted in habitat and in species. "Zimmerman 1920 (Junk, Coleop. Cat. part 71 p. 301-2) catalogues only five species, one variety and one synonym under *Brychius* but omits *B. parvulus* Roberts." (Barber).

Brychius albertanus n. sp.

The type, labelled South Fork River, Pincher Creek, 21–VIII–26 is to be deposited, along with a paratype, in the Canadian National Collections. A paratype from the type locality will be deposited in the U.S.N.M. One will be placed in the collection of the University of Alberta and one in the collection of the California Academy of Sciences. The balance of the type material will be left in my collection. The type specimen is a male.

Length—3.2 mm. The general color is very light yellow with dark brown markings very clearly defined. The general shape is slender and lacking in robustness. In common with the other species of the genus the surface is covered with a sculpture of fine punctures which requires considerable magnification to make visible. Where punctures are mentioned in the descriptions which follow, the reference is to a much coarser series.

Head. The head is pale yellow with no darker markings. It is coarsely punctate, the punctures being separated by less than their diameters. The eyes are prominent and are silver in color. The antennae are yellow. The labrum is shallowly emarginate.

Pronotum. The pronotum is broadly emarginate with the anterior angles prominently produced. The posterior margin is bisinuate with a prominently projecting process in the middle replacing the scutellum. The pronotum is slightly more than twice as wide as long (omitting the length of the process in this measurement). Shallow basal fovea are present. Parallel to the sides and somewhat distant from them a groove extends from the base to the anterior fifth, (this groove varies so much in the series that it has not been found possible to use it as a determining character). From the base of the groove and anteriorly and towards the middle of the pronotum extends a carina. This also varies so much that it could not be used at all effectively in distinguishing the species). The surface is punctate irregularly with coarse punctures over its entire surface, the punctures being coarser on the anterior and posterior magins.

Prosternum. The prosternal process is flat, margined and coarsely punctate. Along the margins it is pigmented. In shape it is constricted definitely in the region of the anterior coxae and is broadened greatly to meet the metasternal process; anterior to the coxae the sides are parallel forming a rectanguiar lobe. The sides of the process anterior to the coxae are not punctate. The posterior margin is emarginate and the posterior angles produced.

The metasternal process and the antecoxal piece are sparingly punctate with coarse punctures. The sidepieces of the metesternum bear a very few punctures.

Coxae. The coxae are rounded behind. They are punctate with coarse punctures except for an area parallel to the median line in which a few smaller punctures only are found and which are not visible under moderate magnification. The coarser punctures alone are pigmented on the coxae.

Abdomen. The abdomen is sparingly punctate with medium sized punctures. The last two segments are clear yellow, the others show more or less brown pigment. The angle of the last abdominal segment is very acute.

Legs. The legs are yellow. On the lower surface of the posterior femora on the middle line is to be found a row of setigerous punctures starting about one sixth from the knee.

Elytra. The elytra are yellow; the brown pigment is to be found in the punctures only. In the striae this brown is abbreviated considerably basally and apically, and only the first six are pigmented uniformly. No humeral spot is present nor is the V shaped spot on the suture to be seen. At the middle and at the three quarters the pigment spreads laterally over the seventh and eighth striae. The elytral margin tapers from the first sixth to the apex. Just behind the three quarters the elytra are distinctly depressed, producing a pinched-in appearance. As in the other species the posterior part of the elytral margin is serrulate.

Brychius pacificus n. sp.

The type, labelled Humboldt Co. Cal. Coll. J. D. Sherman, Jr. 1926, along with the two paratypes, one from the type locality, the other from Okanagan Landing, B. C., are deposited in the U.S.N.M.

Length 3.75 mm.

The general color is reddish yellow with the markings dark piceous and not clearly defined in outline.

Head. The head and antennae are reddish yellow. The eyes are prominent and are pearllike in color and lustre. The head is punctate with punctures smaller than those in *albertanus* and separated by more than their diameters.

Pronotum. The color is reddish yellow with a piceous spot at the middle on the anterior margin and two spots on the posterior margins covering the fovea and joined basally by a piceous band. The surface is covered with coarse punctures which are coarser in the piceous areas. The anterior and posterior margins are bisinuate, projecting anteriorly and posteriorly along the middle line. The anterior angles are produced very little. The width is about twice the length. The basal fovea are faint. As in *albertanus* a groove and a carina are present.

Prosternum. The prosternum is reddish yellow, the lateral and posterior margins are deeply pigmented. The posterior margin is truncate. The surface is very coarsely and thickly punctate. It is very little constricted at the front coxae; from this point it gradually widens anteriorly, thus making the anterior lobe distinctly wedgeshaped. The sides of the process anterior to the coxae are coarsely punctate.

The metasternal process is sparingly punctate; the sidepieces and the antecoxal piece are coarsely punctate; all are deeply pigmented with piceous. The whole surface is conspicuously punctate with coarse punctures.

Abdomen. The abdominal segments are all heavily pigmented with piceous the last two, only, showing any of the lighter ground color. All the segments are coarsely punctate. The last segment is almost obtusely angulate.

Legs. The legs are yellow. The row of setigerous punctures on the lower surface of the posterior femora is very limited in extent.

Elytra. The elytra are reddish yellow with the five inner striae of punctures pigmented; the color is abbreviated apically but hardly basally. It is to be noted that the pigment spreads from the striae unto the intervals. A piceous humeral spot is present covering the sixth and seventh striae and the intervals. At the middle is another spot stretching over the sixth, seventh, eighth and ninth striae and intervals. At the three quarters is found another spot covering the seventh and eighth striae and intervals. The elytra taper from the sixth to the apex.

To make the descriptions of use a short description of *hornii* Cr. has been prepared.

Brychius hornii Cr.

Occurrence-Siskiyou Co. Cal.; Ogden Ut.; Corvallis, Ore.

Length, 3.75 mm.

The general color is yellow with almost black markings.

Head. The head is closely and coarsely punctate; the eyes are black and prominent.

Pronotum. The pronotum resembles that of *pacificus,* the anterior and posterior margins are bisinuate, the anterior angles are not prominent. There is a dark spot on the anterior margin but just traces on the posterior margin. The punctures in size and distribution resemble those on the pronotum of *pacificus.*

Prosternum. The prosternal process is coarsely punctate; it is scarcely constricted at the coxae; it is slightly emarginate posteriorly and the anterior lobe is slightly wedgeshaped. The sides anterior to the coxae are obsoletely punctate.

With reference to *parvulus* Roberts, Mr. Barber writes me—

"Its convex pronotum, with side strongly arcuate and convergent, and with the basal impressions at lateral fourth deep but short, without trace of the sinuate carina which in *elevatus* and *hornii* extends from the base at lateral sixth to apical fourth, together with the gibbous apically acuminate elytra and the much narrower and anteriorly not prominent prosternum, seem to me to be good enough characters for generic segregation."

KEY TO SPECIES

Strong convex in shape; the pronotum convergent anteriorly; size less than 2.75 mm ..... *parvulus.*

Not distinctly convex in shape; the pronotum rectangular in shape. Size three or more mm.

The prosternal process not punctate laterally, the anterior angles of the pronotum produced ..... *albertanus.*

The prosternal process punctate laterally more or less; the anterior angles of the pronotum not produced. The prosternal process coarsely punctate laterally; the eyes are pearllike in color and lustre ..... *pacificus.*

The prosternal process is obsoletely punctate laterally and anteriorly; the eyes are black ..... *hornii.*

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